

Artificial Intelligence in Language Teaching: Using ChatGPT to assist teachers of English as a Foreign Language

Intelligenza Artificiale e insegnamento delle Lingue: ChatGPT a supporto del docente d'Inglese Lingua Straniera

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Abstract

This paper delves into the application of Artificial Intelligence (AI) to assist teaching practices through task-oriented dialogues. Specifically, it presents a practical implementation of ChatGPT in analyzing forum posts from two groups (n=30 and n=25) of first-year university students studying English as a Foreign Language (EFL). The experiment discloses the potential of AI in the field of education, particularly in linguistic-semantic evaluation, predictive analysis, and psychological profiling. In contrast, the free use of ChatGPT has limitations in the size of inputs it can analyze in a single interaction, while its accuracy and complexity remain unaffected in its unpaid version. The paper aims to provide a practical experience that can promote the further adoption of AI in education, along with guidelines for piloting its ethical application.

Keywords: ChatGPT; AI in teaching; didactic design with ChatGPT; ChatGPT in language teaching; EFL with ChatGPT.

Sintesi

Il contributo affronta l'uso dell'Intelligenza Artificiale (IA) per assistere la pratica docente attraverso dialoghi task-oriented. In particolare, presenta l'utilizzo pratico di ChatGPT per analizzare post estrapolati dai forum didattici di due gruppi (n=30 e n=25) di studenti universitari al primo anno frequentanti corsi accademici d'inglese come lingua straniera. L'esperimento rivela le possibilità che l'IA offre nel campo dell'educazione, specificamente nella valutazione linguistico-semantiche, nell'analisi predittiva e nel profiling psicologico. Per converso, l'uso gratuito di ChatGPT presenta alcune limitazioni nella dimensione degli input che può analizzare in un'unica interazione, mentre l'accuratezza e le capacità di analisi rimangono invariate nella versione non a pagamento. Il contributo mira a fornire un'esperienza pratica che può stimolare l'adozione dell'IA nel settore educativo, congiuntamente a idonee linee guida per un orientamento etico durante l'applicazione.

Parole chiave: ChatGPT; IA nella didattica; progettazione didattica con ChatGPT; ChatGPT nell'insegnamento dell'inglese; inglese come L2 con ChatGPT.

1. Introduction

Alan Turing, the renowned British computer scientist, is widely regarded as the father of computing and artificial intelligence (AI). Since the introduction of his well-known imitation test to gauge to what extent a computer could mimic human behavior, questions about whether computers can replace human intelligence have been under consideration (Brynjolfsson, 2022). Nowadays, we heavily rely on computers for a range of thinking tasks, from simple calculations on our smartphones to complex computations performed by supercomputers for social, economic, and complex climate prediction. Turing's stance was not so much about whether computers could genuinely think in the same way humans do, but rather about whether they could simulate intelligent behavior convincingly enough to pass as human. He believed that machines could eventually exhibit behaviors that were indistinguishable from human intelligence, thus paving the way for the development of the concept of AI. Unlike computational thinking, which is applied to tasks such as analyzing big data and overseeing logical patterns, AI aims to replicate and simulate human interaction (Hassani, Silva, Unger, Tajmazinani & Mac Feely, 2020). As we go about our daily lives, we witness the increasing prevalence of AI and its transformative power. Machine learning is the backbone of these modern AI systems, enabling them to learn from vast amounts of data and constantly improve their intelligence. AI is undoubtedly changing the world we live in, and the possibilities for its application are endless (Chen, 2023; Tursunbayeva & Renkema, 2023; Zarifhonarvar, 2023).

1.1. ChatGPT: an overview

The use of OpenAI's conversational AI model, commonly known as ChatGPT, has become increasingly popular in the last two years, providing a new perspective on educational technology. Essentially, Generative Pretrained Transformer (GPT) is an AI-powered model developed by OpenAI that generates human-like text based on input data. The interface of ChatGPT is a chatbot launched on November 30, 2022. A chatbot is a software program that enables interaction between the user and the complex set of algorithms that makes up an AI's cognitive network (Wu et al., 2023). In simpler terms, the chatbot is the interface that allows users to dialogue with ChatGPT. This AI tool uses Large Language Models (LLM), which is a class of machine-learning models for natural language processing and can be interacted with using natural language (De Kok, 2023; Meyer et al., 2023). LLMs not only analyze vast amounts of textual data and infer relationships between words within a text but also enhance their capabilities alongside the size increase of datasets and inputs. The application possibilities for this technology range from analyzing cases about various sectors – from productive sectors to sociology – and from generating complex texts, even at an academic level, to writing entire sections of coding strings in various programming languages (Aljanabi, Ghazi, Hussein & Abas Abed, 2023). Currently, major concerns associated with implementing this new technology into the education sector revolve around ethical implications tied to academic integrity and plagiarism (Barrett & Pack, 2023). Indeed, AI-generated texts are now indistinguishable from human-produced ones and the most frequent observations emerging from the current literature fluctuate between enthusiasm and concern (Chen, Chen & Lin, 2020; Lim et al., 2023; Osamor, Kulume & Cherukut, 2023; Xiong, Shi, Pu & Liu, 2023). Nevertheless, education institutions have gone through similar pathways of acceptance in the past, such as with calculators and more recently smartphones, before incorporating these devices into their curricular routines (Carlsson & Willermark, 2023). It is important to note that while some experts argue that AI technology, in its current state of development, does not offer significant new benefits for pedagogy in higher education (O'Dea & O'Dea, 2023), others believe that there is

potential for AI to greatly enhance the learning experience (Florea & Radu, 2019; Fu, Lokesh Krishna & Sabitha, 2021; Mallik & Gangopadhyay, 2023). While it is true that there is a lack of a clear definition of the pedagogical advantages of AI, further research and development can help to identify its potential benefits. Additionally, by exploring how AI technologies and applications can assist students and tutors in making effective pedagogical changes, we can begin to unlock the full potential of AI in education. Indeed, the first stage of AI-based educational research focused mostly on theorizing models, approaches, and protocols (Bin-Hady, Al-Kadi, Hazaea & Ali, 2023; Ouyang & Jiao, 2021; Xiong et al., 2023), while emerging current perspectives center also on documented case studies and practical experiences (Connolly et al., 2023; Ghafouri, 2024; Song & Song, 2023; Tlili et al., 2023). This could be a sign that AI is moving out of the academic-theoretical environment and is being perceived as an effective tool in everyday teaching.

1.2. ChatGPT and teaching of English as a Foreign Language (EFL)

The benefits and applications of chatbots in language learning (LL) include creating a relaxed learning environment, increasing student motivation, providing feedback on spelling and grammar, facilitating reading and listening practice, and serving as conversation partners (Nguyen, 2023). Also, the effectiveness of chatbots has been demonstrated in supporting grammar proficiency, reducing language anxiety, and improving studies toward AI interactions (Song & Song, 2023). Generally, instructors perceive chatbots as user-friendly technology that enhances interaction, teaching presence, and critical thinking processes (Halaweh, 2023). Nevertheless, concerns emerge about privacy and security when integrating chatbots into education and the need for instructor training on how to effectively implement this technology for instructional design (Tlili et al., 2023). Eventually, also financial aspects should be considered for implementing and maintaining chatbot systems to align with evolving LL trends (Nguyen, 2023). Specifically, its application in EFL offers an innovative approach to LL. Brown et al. (2020) extensively discussed the potential of this AI technology, highlighting its versatile capabilities that include translation tasks and content creation, among others. For instance, educators can use it to provide instantaneous feedback on grammar and vocabulary usage during interactive sessions (Mohamed & Alian, 2023). Furthermore, it can serve as a virtual assistant for teachers in managing administrative tasks such as creating lesson plans.

An increasing amount of literature is available to gather documented experiences on how ChatGPT can improve LL settings. Kohnke, Moorhouse and Zou (2023) discuss the affordances and pedagogical benefits of ChatGPT for language teaching and learning and highlight how AI can effectively provide linguistic input, conversation practice, personalized learning materials, formative assessments, and immediate feedback to enhance language acquisition. Many in the field discuss the debates and concerns surrounding the use of AI-powered chatbots. These concerns include ethical issues, accuracy of responses, and cultural biases. Frequently, contributions stress the importance of digital literacy among both teachers and students to effectively use ChatGPT while being aware of its limitations (Song & Song, 2023; Xiao & Zhi, 2023; Yan, 2023). In general, every research approach highlights that AI-driven digital tools are becoming increasingly prevalent and urges educators to explore their potential responsibly and thoughtfully.

A recent study by Ghafouri (2024) explored the potential benefits of ChatGPT technology, in creating an emotionally supportive learning environment. The researchers aimed to profile non-correlational evidence in L2 emotion studies and connect the field of AI with positive psychology. According to the findings, students who received English language

instruction using a ChatGPT-based method performed better than the control group in terms of their perseverance and passion for learning an L2, indicating that a well-organized and step-by-step ChatGPT-based instruction could improve L2 grit. It typically refers to “Second Language Grit,” which is a concept related to perseverance and passion for learning a second language. It encompasses traits such as resilience, determination, and sustained effort in the face of challenges encountered while acquiring proficiency in a second language. Just like grit in other contexts, L2 grit emphasizes the importance of perseverance and long-term commitment in language learning, even when faced with setbacks or difficulties (Teimouri, Plonsky & Tabandeh, 2022). The findings have both theoretical and pedagogical implications for language education, highlighting the potential benefits of integrating AI technologies into language teaching practices. Overall, these studies contribute to the exploration of the role of AI in language education and emphasize the importance of creating an emotionally supportive learning context. The results suggest that using a ChatGPT-based protocol can enhance L2 engagement, which has implications for promoting long-term LL success. The present contribution aims to demonstrate a practical use of this powerful tool using the same research approach.

2. Methodology

2.1. Approaching ChatGPT

The first step required is to create a profile on the OpenAI platform (<https://chat.openai.com/auth/login>); and after the authentication passage by verifying your email, you can log in with your access data.

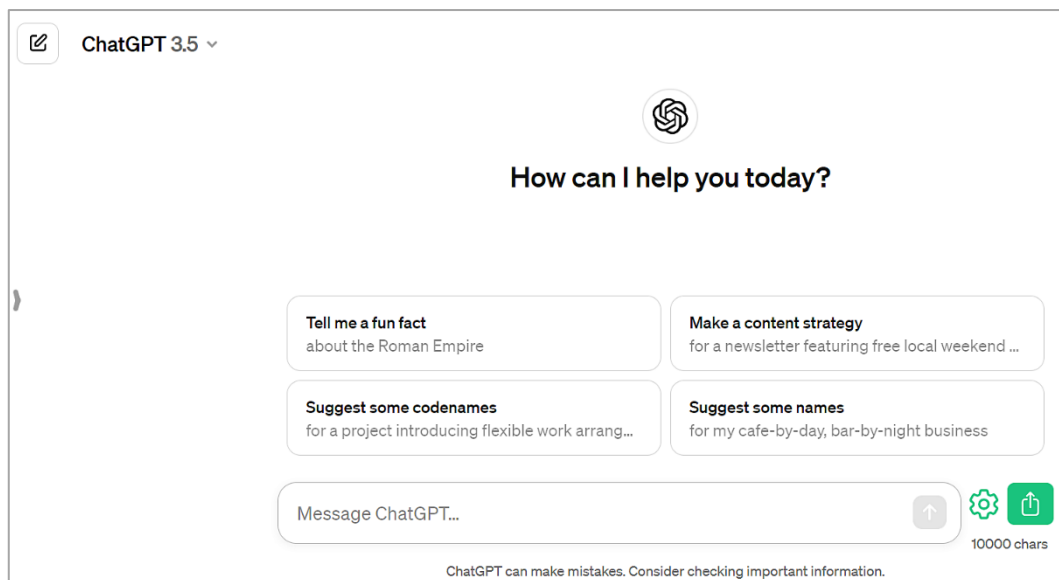


Figure 1. Welcome page of ChatGPT 3.5.

In the intuitive display that appears, you are greeted by the “How can I help you today?” message at the center of your screen, along with four casual prompt suggestions that may change every time you log in again (Figure 1). The active field at the bottom of the page is ready to accept our prompts that require nothing more than a command or question stated

in our language. Currently, ChatGPT supports over 50 languages and can handle operations simultaneously in multiple languages. In other words, it is possible to request an analysis of English texts while writing prompts in Italian, Finnish or Chinese language. The ChatGPT 3.5 menu at the top left allows you to switch to the premium version of ChatGPT 4. The experience reported in the present paper was entirely made with the 3.5 free version.

2.2. Pseudonymization of the 1st sample

The process of pseudonymization involves the handling of personal data in a way that protects individuals' privacy while ensuring compliance with privacy regulations, such as the General Data Protection Regulation (EC, 2016). This operation is especially important in education or research settings where sensitive data is necessary for analysis or studies. Pseudonymization involves replacing direct identifying information with artificial identifiers or pseudonyms, making it impossible to trace the data back to a specific individual without additional information. In our case, we selected a sample of 30 posts written by 30 students of the Faculty of Economics, Sapienza University of Rome, attending a course of EFL-B1 level in the second semester of 2022 a.y., and assigned unique pseudonyms to each student. These pseudonyms were used throughout the analysis or research process to replace personal information. For instance, each student's name was replaced with an "S" followed by a random and non-sequential number: S1, S12, S4, etc. We also substituted direct details within textual content (comments and posts) with aliases or common names. Any reference to places, cities or other elements that could be used to identify students was replaced with more general information. Finally, the pseudonymized data and appropriately anonymized textual content were stored without any direct or indirect reference to the pseudonymization process. This approach enables data sharing while preserving the full anonymity of the original authors. It is unfeasible to reverse the process and trace the text authors back to their pseudonyms. To provide an additional layer of protection when potentially sharing data, the file that includes pseudonymized content has also been amended from the last author's associated data who modified it.

2.3. Instructing ChatGPT to perform evaluation duties

The initial prompt entails evaluating an activity that the teacher posted for students. This task involved writing a personal introduction to help initiate interaction and engagement among students, referred to as "breaking the ice". A rule of thumb is that of providing detailed prompts to encompass a detailed context.

PROMPT

Analyze the following set of 30 introductions written by first-year Italian native students who are currently enrolled in the Faculty of Economics and are taking a B1 level English as a foreign language course. These introductions may contain errors and interferences caused by Italian syntax. Analyze these introductions and identify the most common errors. Provide specific examples wherever necessary. Each student's name has been anonymized as "S" followed by a number, and any personal information such as town or related names has been replaced with square brackets. Once you have completed your analysis, please provide general considerations on this group of students and their weaknesses related to English proficiency.

Then, we copied and pasted the list of 30 posts that were previously published in the forum [omitted in the present paper] exactly as they were originally written, with no alterations or edits made. Due to the limitations of the free version, GPT-3.5 has a maximum response length of 4,096 tokens, which corresponds to approximately 1,000-3,000 words, and this

sum accounts for both inputs and outputs. This constraint will require us to segment long sequence of texts in multiple copy-and-paste operations. Therefore, we copied and pasted the 30 students' replies in four different moments, taking advantage of the ChatGPT capacity to retain the memory of the previously analyzed texts, in the same chat session. Outputs are always generated after a few seconds. The structure of the paragraphs and their numbering have been preserved from the original ChatGPT communication. No changes have been made to the way the message is organized and presented. To emphasize the examples included in the AI feedback, we have italicized them.

OUTPUT

Based on the set of 30 introductions, some common errors and weaknesses related to English proficiency can be identified:

- incorrect verb tenses. There are instances where students use incorrect verb tenses, such as not conjugating verbs correctly or using the wrong tense altogether. For example: "*I attend*" instead of "*I am attending*" or "*I've a little sister*";
- incorrect use of prepositions. Students sometimes struggle with using prepositions correctly in their sentences. For example: "*I'm passionate with studying economics*";
- sentence structure. Some students have difficulty with sentence structure, resulting in run-on sentences which may be improved for better readability. For example: "*We're planning to start a study group for the next exams, and also we'll be going to the library often*";
- word choice and vocabulary usage. Some students may use words that do not fit contextually or may choose incorrect vocabulary words for certain expressions;
- capitalization and punctuation errors. Students occasionally make capitalization and punctuation errors throughout their introductions.

Overall, it is evident that these students are at a B1 level of English proficiency as they demonstrate a basic understanding of grammar rules and vocabulary usage but still struggle with common errors and interferences caused by Italian syntax. They often rely on literal translations from Italian to English, resulting in inaccurate word order and sentence structure. There is also a need for improvement in using correct verb tenses, prepositions, and appropriate vocabulary choices.

These students need to focus on practicing sentence construction, verb tenses, and preposition usage to enhance their overall English proficiency. Engaging in activities that encourage writing and speaking exercises can help improve their accuracy and fluency. Additionally, expanding their vocabulary through reading materials, listening to native English speakers, and actively using new words in daily conversations can contribute to their language development.

Overall, these students show motivation to improve their English skills despite the challenges they face. With targeted practice and exposure to authentic English materials, they have the potential to make significant progress in enhancing their overall proficiency level at B1.

We will now test the ability to create appropriate tasks based on the analysis we have just done. It is worth noting that ChatGPT provides the complete task, namely, exercise and solutions. We will also make some observations on some of the sentences provided.

PROMPT

Create a set of 20 sentences that students have to correct. These sentences will be inspired by some of the most common mistakes you found.

OUTPUT

Certainly! Here is a set of 20 sentences with common mistakes for students to correct:

1. I attend the university, and my major is business administration.
2. Last summer, I went to traveled in France and Italy.
3. He plays soccer since he was five years old.
4. My favorite book is wrote by J.K. Rowling.
5. We are studied hard for the exam yesterday.

6. The concert starts in 7 p.m., so don't be late!
7. I have been living in [town] since ten years ago.
8. She likes to goes shopping on weekends with her friends.
9. My father has work as an engineer for over 20 years.
10. They are going to visited their grandparents next month.
11. The movie was so good that I've watched it two times already!
12. Can you borrowing me your pen? I forgot mine at home.
13. He didn't went to school yesterday because he was sick.
14. My sister she works as a teacher at the local school.
15. In the summer, we usually goes on vacation to the beach with our family.
16. They're going out tonight? So I too!
17. I've never seen a such beautiful sunset before in my life!
18. My parents and I went to visit my uncle, that lives in a small town near Milan.
19. We have to finished our project by tomorrow.
20. The weather is very hot today, so I'm going at the beach.

Please note that these sentences contain common mistakes such as incorrect verb tenses, subject-verb agreement errors, and preposition usage errors. Students should correct these mistakes to make the sentences grammatically accurate.

Here are the corrected versions of the sentences:

1. I attend university, and my major is business administration.
2. Last summer, I traveled to France and Italy.
3. He has been playing soccer since he was five years old.
4. My favorite book is written by J.K. Rowling.
5. We studied hard for the exam yesterday.
6. The concert starts at 7 p.m., so don't be late!
7. I have been living in [town] for ten years.
8. She likes to go shopping on weekends with her friends.
9. My father has worked as an engineer for over 20 years.
10. They are going to visit their grandparents next month
11. The movie was so good that I watched it two times already!
12. Can you lend me your pen? I forgot mine at home.
13. He didn't go to school yesterday because he was sick.
14. My sister works as a teacher at the local school.
15. In the summer, we usually go on vacation to the beach with our family.
16. They're going out tonight? So am I!
17. I've never seen such a beautiful sunset before in my life!
18. My parents and I went to visit my uncle, who lives in a small town near Milan.
19. We have to finish our project by tomorrow.
20. The weather is very hot today, so I'm going to the beach.

In these corrected sentences, the verb tenses, subject-verb agreement, and prepositions have been adjusted to make them grammatically accurate.

Some of the examples provided by ChatGPT may require detailed explanations and specific contextualization from the teacher. For example, the first sentence, "I attend university" is a more general statement, indicating that the speaker attends any university without specifying which one. Conversely, "I attend the university" refers to a specific university that has already been mentioned or is known within the context of the conversation. We will not be using AI to provide grammar feedback in this experience, being aware that the vast sources of data available for AI include all possible grammar resources and contexts. Indeed, supposing that the teacher needs a detailed explanation of each single mistake, we will ask AI the following:

PROMPT

The following ten sentences contain a mistake each. Explain every single mistake so that students learning English may improve their proficiency.

[follows the copy and paste of ten of the previous sentences which included mistakes 1-10]

OUTPUT

1. The mistake in this sentence is the use of “the” before “university.” It should be “I attend university” since we are referring to attending university in general, not a specific university.
2. The mistake in this sentence is the use of both “went” and “traveled.” Only one verb is needed to indicate past tense, so it should be either “Last summer, I went to France and Italy” or “Last summer, I traveled to France and Italy”.
3. The mistake in this sentence is the use of present tense (“plays”) instead of past tense indicating an action that started in the past (“played”). It should be “He played soccer since he was five years old”.
4. The mistake in this sentence is the use of “wrote” instead of “written.” When discussing a book written by someone, we use the past participle form of the verb. It should be “My favorite book is written by J.K. Rowling”.
5. The mistake in this sentence is the incorrect verb form after the subject pronoun “we”. Instead of saying “We are studied hard,” it should be either “We studied hard for the exam yesterday” or “We were studying hard for the exam yesterday”, depending on whether you are referring to a specific moment in the past or a continuous action.
6. The mistake in this sentence is the use of “in” instead of “at” when indicating a specific time. It should be “The concert starts at 7 p.m., so don’t be late!”.
7. The mistake in this sentence is the incorrect use of “since” and “ago”. “Since” indicates an ongoing action from a specific point in the past, while “ago” indicates a completed action. It should be “I have been living in [town] for ten years”.
8. The mistake in this sentence is the use of both “likes” and “goes”. Only one verb is needed to indicate present tense, so it should be either “She likes to go shopping on weekends with her friends”.
9. The mistake in this sentence is the incorrect verb form after the subject pronoun “has”. Instead of saying “My father has work”, it should be either “My father has worked as an engineer for over 20 years”.
10. The mistake in this sentence is the verb tense. In English, we generally use the base form (infinitive) after modal verbs like “going to”. It should be either “They are going to visit their grandparents next month”.

The contextualization of mistakes serves as a valuable tool to support various aspects of a teacher’s routine, including initial teacher training and assisting students in their individual learning journeys.

2.4. Pseudonymization of the 2nd sample

The same procedure described for the pseudonymization of the first sample was followed. The next group of texts was extracted from a different educational forum on the Moodle e-learning platform. This time there were 25 posts of an EFL-B2 level course delivered in the second semester of the 2023 a.y., at the Faculty of Pharmacy and Medicine, MS in Chemistry and Pharmaceutical Technologies, Sapienza University of Rome.

2.5. Logical-semantic analysis

As shown, the current version, GPT-3.5, can understand and generate text coherently, providing a versatile tool for a variety of educational applications. Regarding text entry for analysis purposes, this can be done via a simple copy-and-paste operation. Again, due to

the limited number of words processed by the free version, analyzing a text or sequence of texts with great length will require segmenting content.

PROMPT

I am about to paste all the presentations provided in a forum by 25 students, in English. I need to perform a semantic analysis. Can you help me?

OUTPUT

Certainly, I can assist you with the semantic analysis of the student-provided English language presentations. You can paste the text of one or more presentations, and I will do my best to analyze their semantic meaning. Keep in mind that semantic analysis may involve identifying key concepts, recognizing relationships between words, and understanding the overall meaning of the text.

PROMPT

Each presentation is preceded by a code identifying the student and is associated with its publication date.

OUTPUT

Perfect, thank you for clarifying. When you're ready, paste the text of one or more presentations along with their corresponding student codes and publication dates. It would be helpful to have a specific sample for beginning semantic analysis.

The next step is copying and pasting the entire sequence of 25 posts in English (which is omitted in this publication) directly into ChatGPT, in the following format: date and time, student code, post text, and word count. As for the first sample, the initial optional activity assigned to students via the teacher's post requires a brief personal introduction to "break the ice". Of 48 students registered for the e-learning course space, 25 carry out this first activity. The subsequent sections of our contribution continue by examining these 25 posts. As anticipated, ChatGPT proceeds with the analysis of labels about the information identifying the different posts, then swiftly moves on to recognize and isolate semantic areas. When an input includes omitted words or terms replaced by generic ones (pseudonymization), square brackets are used. Each output from ChatGPT begins with a brief introductory comment and ends with a closing remark.

PROMPT

Introduction – Let's break the ice

Number of answers: 25

"Introduce yourself and your background. Tell us something about your expectations for this English course and the Pharmacy degree program you are attending".

[follows the copy and paste of the 25 posts]

OUTPUT

Thank you for the information. You have provided various student presentations. For semantic analysis, we can start extracting some key information and common themes from each presentation. For example, we can analyze:

1. Personal information:
 - student identification code;
 - age;
 - year of study.
2. Motivations for enrolling in the course:
 - reasons for choosing the degree course in Chemistry and Pharmaceutical Technologies;
 - interest in science, scientific research or the pharmaceutical industry;
 - expectations from the English course.
3. Past experiences and interests:
 - academic background and motivations for choosing Chemistry and Pharmaceutical Technologies;

- personal interests and passions such as music, sports, etc.;
 - past experiences and reflections on choosing the study path.
4. English skills and learning objectives:
 - level of confidence with English language;
 - motivations to improve language skills;
 - expectations from English Course.
 5. Career goals:
 - professional ambitions/aspirations;
 - vision on job opportunities in pharmaceutical field;
 - role of English language in future careers.

Once you have extracted this information, you can further analyze the data to identify trends, similarities or differences between student presentations. If you have specific questions or particular requests, feel free to ask!

At this point, we want to test ChatGPT's ability to distinguish between formal and informal linguistic structures and to associate communicative style with behavioral aspects.

PROMPT

Analyses the linguistic structures used by distinguishing between formal and informal ones and highlighting those that adopt a more open approach compared to those that are more reserved.

OUTPUT

Certainly, let's analyze the linguistic structures used in student presentations, distinguishing between formal and informal ones and highlighting those that use a more open approach compared to those that are more reserved. Below, I provide examples of both:

- More open approach (informal):
 - "Hi, my name is S31, I'm nineteen and I'm attending this degree course because I like science subjects, especially chemistry". This approach is informal, with a friendly beginning and the direct expression of personal interests.
 - "Hi, I'm S5, I'm 19, I live in [town], and I'm a university student. I have always been a very lively and creative person, and this has meant that I have many interests". The use of "Hi" and the personal introduction create an informal and open tone.
 - "Good evening, today I'll be speaking to you about myself. I am S32, I'm nineteen and I study at the [...] at the Faculty of Chemistry and Pharmaceutical Technologies but I'm not from [town], I live in [town], in fact, I'm a commuter". The use of "Good evening" adds a formal touch, but the detailed personal introduction maintains an open tone.
 - "My name is S30, I'm 21 years old, and I'm a Chemistry and Pharmaceutical Technology student". This presentation is concise but open, providing essential information clearly.
- More reserved approach (formal):
 - "Hi, I'm S2, and I'm studying Pharmacy at university. I appreciate this degree course and all the job opportunities that it can offer me". It starts with a friendly greeting, but the overall tone is more formal, focusing on the degree program and job opportunities.
 - "Hi, I'm S12 and I am attending this course because I love chemistry and biology. I am excited that there is an English course in my degree programme because it will definitely help me in my future job". Despite the use of "Hi", the tone is primarily formal, emphasizing enthusiasm for the course and future job opportunities.
 - "Hello, I am S19 and I am a pharmacy student. Since middle school, I have been interested in biology, chemistry, and medicine". The use of "Hello" imparts a more formal tone, and the presentation is focused on academic interests.

In general, presentations are often a combination of formal and informal tones. Openness and a personal approach can make a presentation more engaging, while formality conveys a sense of professionalism.

We observe how ChatGPT's output tends to confirm an implicit suggestion from the input,

namely the association of formal with reserved and informal with open, even though the closing output aims to clarify this ambiguity. Furthermore, within the output, we note that the degree of formality is also motivated by the type of topics included in the posts, not just by linguistic structures. This is an example of how the structure of our input may influence the AI and lead it to reinforce an algorithm bias (Dwivedi et al., 2023). In other words, our overly synthetic input has set a context that does not allow for the possibility that career or academic future themes may also be presented in an informal style; conversely, ChatGPT has highlighted this possibility.

The next step is questioning the AI to extract those grammatical and lexical structures that show a greater tendency to integrate with the class group. We notice how the AI selects the most relevant posts and directly elaborates analytical comments based on the content. In addition, AI addresses the third person with the pronouns They/Them.

PROMPT

Based on these presentations, are there students who show a greater personal involvement in the study community?

OUTPUT

Yes, some presentations suggest a greater personal involvement in the study community. Here are some observations.

- S32. The presentation is extremely detailed and personal. In addition to discussing their academic journey, they also share being a commuter and their involvement in [...]. These details provide a comprehensive picture of their life and the challenges they face, showing strong engagement in the study community.
- S25. He/she talks about their constant passion for science and their journey through classical studies. Their reflective approach to past experiences and search for effective knowledge highlights a deeper commitment to the study community.
- S4. Besides expressing enthusiasm for English language and scientific subjects, also he/she shares their challenge of not having had the opportunity to study them thoroughly in the past. This sincerity and willingness to improve indicate a desire to grow within the academic community.
- S18. He/she shares their interest in scientific research and moving from [city] to [city] for university studies. They also talk about their passion for art and music, adding a personal touch. This presentation suggests strong involvement in the academic community and a desire to explore different aspects of university life.

These are just a few examples, and other students may have similar involvement in the study community. Personal projection can be evident through the sharing of experiences, challenges, and passions that go beyond the academic realm.

To truly understand the students' perspective on their English language studies, we must isolate their comments and evaluations that specifically relate to this topic. By doing so, we can gain valuable insights into their experiences and identify areas where we can improve our approach to teaching English.

PROMPT

Do students comment on their proficiency, knowledge, or difficulties regarding the study of the English language?

OUTPUT

Analyzing the students' interventions, we can observe several comments related to proficiency, knowledge, or difficulties in studying the English language.

- S32. Comments on initial hesitation regarding their course choice and emphasizes that, despite coming from a classical high school, they have acquired the necessary skills to tackle the university's scientific curriculum.

- S33. Comments that English was the subject in which they encountered the most difficulties but expresses enthusiasm and determination to overcome challenges and give their best.
- S14. Does not directly specify difficulties but expresses passion for scientific subjects and a desire to improve English proficiency through the course.
- S4. Emphasizes a lack of sufficient opportunities to study English in-depth in the past but is eager to enhance linguistic competence and engage in scientific research.
- S39. Acknowledges that despite English knowledge acquired over the years, it is insufficient. Expresses hope that the course will provide the tools needed to overcome weaknesses.
- S40. Reflects on the importance of English in scientific research and the intention to improve and enrich linguistic skills through the course.
- S38. Comments on the transition from musical studies to scientific ones, highlighting the allure of chemistry as “the study of change”. Expresses hope to expand scientific vocabulary and become familiar with writing short essays.
- S23. Recognizes not having paid much attention to studying English in the past. Considers the course an opportunity to learn the most widely used language globally without future limitations.
- S18. Comments on an affinity for scientific research and the desire to acquire biological and practical skills during university studies. Also reflects on the importance of English in the research field.
- S41. Reflects on personal growth in learning English during the pandemic, emphasizing progress through watching movies and series in the original language. Stresses the need to improve both in conversation and writing.
- S7. Enthusiastic about participating in the course and expresses hope to acquire skills for understanding and writing scientific articles, highlighting the willingness to improve overall English proficiency.

Now, we will ask ChatGPT to delve into the similarities and differences identifiable within the presentations. We will not provide any guidelines or logical-semantic criteria; we let the algorithms’ presets identify these aspects.

PROMPT

Can you identify the major similarities and differences among all the presentations?

OUTPUT

Certainly, let’s look at some of the key similarities and differences among the students’ presentations.

- Similarities:
 - motivations for study: many students are motivated by a passion for science, scientific research, or the pharmaceutical industry. The opportunity to work in pharmaceutical research labs is mentioned by several students;
 - academic choices: many have chosen to study Pharmaceutical Chemistry and Technologies due to their interest in scientific subjects, particularly chemistry and biology;
 - importance of English: students recognize the importance of English for their scientific education and future careers;
 - desire to improve language skills: many students express a willingness to enhance their scientific vocabulary in English.
- Differences:
 - personal background: diverse personal experiences, such as coming from different places or participating in parallel study courses, characterize the students;
 - personal interests: variations in personal interests; for example, some are passionate about sports, while others focus on music;
 - language proficiency: differences in confidence levels in English; some feel less confident and hope to improve;

- specific career goals: differences in specific pharmacy sectors that interest students, such as oncology research;
- past experiences and parallel activities: participation in various parallel activities, such as the music conservatory or previous work experiences.

These are just some initial observations. If you would like further insights into specific aspects or have specific questions, I would be happy to help!

From the output, it can be inferred that the AI is capable not only of grouping elements based on lexical grounds but also of recognizing the semantic-conceptual core of the opinions expressed within the 25 posts, encompassing various styles, complexities, and levels of formality. Noteworthy, in the list of differences is the AI's ability to discriminate and cluster separately the stated preferences and interests. Additionally, these elements are organized into five subcategories based on their incidence.

2.6. ChatGPT applied to psychological profiling

In this section, we will ask the AI to analyze the 25 texts to identify elements useful for profiling the students. The initial input is intentionally very generic, allowing the algorithms to autonomously organize all relationships. We observe how the output states the limitations of such an approach. However, the results of the textual screening are noteworthy.

PROMPT

Based on all the interventions, outline the psychological traits of this class group.

OUTPUT

It is important to emphasize that analyzing the psychological traits of a group of students based on their online interventions is a complex and limited task. However, we can attempt to extrapolate some general characteristics that emerge from the provided interventions:

- determination and enthusiasm. Many students demonstrate notable determination in pursuing their academic and professional goals. Enthusiasm is evident in their aspirations to work in the scientific and pharmaceutical fields;
- passion for science. The majority of students express genuine passion for the sciences, particularly chemistry, biology, and scientific research. This suggests a motivated group interested in scientific studies;
- adaptability and flexibility. Some students highlight their ability to adapt to new study paths, even if they initially had doubts or uncertainties. This flexibility may indicate an open mindset ready to face challenges;
- desire for linguistic improvement. Many students recognize the importance of enhancing their linguistic skills, especially in English. This highlights an awareness of the need for strong language skills in academic and professional contexts;
- diversity of interests. The group shows a diversity of interests outside the academic field, including music, sports, and artistic activities. This suggests a group with varied interests and a balanced approach to life;
- linguistic challenges. Some students reveal linguistic challenges, but most demonstrate a positive attitude in overcoming these difficulties through dedication and a desire for learning;
- professional ambitions. Many aspire to play significant roles in scientific and pharmaceutical research. This denotes an ambitious group looking to the future with determination and interest;
- curiosity and openness to the world. Some students highlight their curiosity about the world, a willingness to learn, and to explore new challenges. This openness may indicate a positive approach to learning and personal growth.

It is crucial to remember that these observations are based solely on the provided interventions and may not fully reflect the complexity of the students' personalities and experiences. Furthermore, online interactions may not reveal all aspects of their lives and personalities.

The next input aims to increase the level of indeterminacy in the question to assess how the AI defines, without further prompts, strengths and weaknesses based on the provided texts. The limitations of this operation are evident in the quantity of data present in the context, namely the 25 posts processed from the forum. However, the quality of the output allows us to grasp the potential of this field of application, namely, in the case where a larger volume of textual content is provided. Whereas screening conducted by a person would require hours of reading, synthesis, analysis, and categorization, ChatGPT takes only a few seconds.

PROMPT

Identify the strengths and weaknesses of this class group.

OUTPUT

Based on the contributions, we can identify some strengths and weaknesses of this class group.

- **Strengths:**
 - passion for sciences. Most students show a strong passion for sciences, particularly chemistry and biology. This enthusiasm could translate into high commitment and positive academic results;
 - determination and career ambitions. Students express determination and ambitions in pursuing careers in pharmaceutical sciences and scientific research. This indicates a motivated group with clear professional goals;
 - diverse interests. In addition to sciences, the group shows a diversity of interests such as music, sports, and artistic activities. This can contribute to a rich and stimulating academic and social environment;
 - willingness to overcome language challenges. Despite some language difficulties, students demonstrate a willingness to confront and overcome these challenges through enrolling in an English course. This indicates an open mindset ready for improvement.
- **Weaknesses:**
 - language difficulties. Some students highlight difficulties in English language. This might pose a challenge in global academic and professional contexts where English proficiency is often crucial;
 - initial uncertainties regarding course choice. Some students show initial uncertainties about course choice or their own preparedness. These uncertainties can affect confidence and fluidity in approaching the study path;
 - need to improve language skills. Many students recognize the importance of improving their English language skills. This suggests that additional effort may be needed to reach the desired level of proficiency;
 - diversity in academic backgrounds. Some students have a diversity of academic backgrounds, coming from different types of schools (classical or scientific). This could lead to variations in basic knowledge and require initial adjustment;
 - possible overlap of academic and artistic commitments. Some students, like Martina Treglia, are juggling both university studies and participation in the Conservatory. This overlap may present logistical challenges and require careful time management.

Overall, the group appears motivated and interested but could benefit from additional support in overcoming language challenges and effectively integrating the diverse academic experiences of its members.

Textual analysis, aimed at making predictions about future behavior, involves exploring statistical models based on language and machine learning of ChatGPT. It is important to note that predictions based on textual analysis have intrinsic limitations and can be influenced by multiple factors. Accuracy depends on the quality of available information and the complexity of human behavior, which can be influenced by unforeseen factors. To understand how AI operates, we need to consider various aspects. Analysis of writing style can take into account aspects such as vocabulary choice, sentence structure, register, and

use of idiomatic expressions. Style characteristics can provide insights into how the writer communicates and may influence their future expression. Evaluating emotions expressed in the text allows for the inference of emotional tones such as positivity, negativity, or neutrality. This analysis can suggest emotional trends that may influence future behavior, for example, if the writer is inclined towards expressing optimism or pessimism. Thematic trends reveal recurring themes in texts, conveying interests, concerns, or preferred topics, thus providing an indication of what the author may find interesting in the future. Inferring the intentions of the writer represents a more sophisticated operation requiring the interpretation of questions, statements, or requests present in the text to predict what actions or responses the author might undertake subsequently. Other elements involved in this analysis are situational context or a history of previous behaviors.

In the following interaction, we aim to prompt ChatGPT to formulate a hypothesis of “educational success” based on the provided texts. Subsequently, we will compare the students identified with the level of engagement they have developed throughout the course, in order to validate the AI’s prediction.

PROMPT

Based on the presentations provided, identify those students who can assume leadership roles in the context of shared learning.

OUTPUT

From reading the presentations, there are some students who could take on leadership roles in the context of shared learning. Characteristics indicating potential leaders include enthusiasm, clarity in aspirations, academic experience, willingness to overcome challenges, and effective communication skills. Here are some students who seem to have these characteristics.

- S32:
 - motivation and passion: shows a strong passion for pharmaceutical research and a desire to contribute;
 - commitment: takes on the challenge of pursuing two university courses concurrently, demonstrating dedication and determination;
 - artistic experience: their experience at the music conservatory can bring a creative perspective and disciplined approach to their leadership.
- S30:
 - clarity in aspirations: clearly expresses a desire to work in scientific research laboratories and the need to improve language skills;
 - passion for science: their passion for chemistry and biology can inspire and motivate other students.
- S25:
 - interest in research: shows a strong interest in scientific research and scientific progress;
 - English experience: has taken math and chemistry courses taught in English, demonstrating a predisposition to tackle language challenges.
- S4:
 - fascination with English language and science: shows enthusiasm for the combination of the English language and scientific subjects, hoping to better understand scientific texts;
 - ambitions and clear aspirations: desires to understand scientific articles, write their own, and participate in international conferences, indicating a clear ambition.
- S18:
 - diverse interests: shows an interest in both sciences and arts, bringing a multidisciplinary perspective;
 - passion for biology: their fascination with biology can inspire other students with similar interests.
- S38:

- transition from music to sciences: their transition from musical studies to scientific studies shows adaptability and determination;
- interest in chemistry: the expressed interest in chemistry and the citation about their view of chemistry as the study of change indicates a reflective approach.

It is important to emphasize that leadership can emerge in different ways, and each student can contribute uniquely to the group. These are just some observations based on the presentations provided.

Once the course was completed, reports from the Moodle e-learning platform showed that the six students initially identified by ChatGPT were among the most active, according to six indicators considered to monitor students' engagement in the timespan February 28 to May 31, 2023.

The following six indicators were measured for each of the six students and compared to the mean expressed by the whole class group:

- total connection time in the e-learning space (in minutes);
- total number of optional contributions/tasks published;
- word count of contributions/tasks (mandatory + optional);
- total number of logins;
- percentage of weeks with at least one login;
- percentage of days with at least one login.

In particular, this group of six students exhibited a symmetric distribution of logins over the three months of the course, unlike most of the group which concentrated logins around the assigned due dates, and excluding those who accessed sporadically, thereby minimizing interactions to the utmost extent. Additionally, these six students represented a subset of the group particularly prolific in terms of writing posts in debates, interventions, and assigned activities, and their contributions consistently exceeded the mean in terms of text length.

3. Discussion

ChatGPT may serve as a valuable tool in educational contexts, particularly in the teaching of EFL. Its application offers innovative approaches to LL by providing instantaneous feedback on grammar and vocabulary usage, facilitating conversation practice, and emphasizing its ability to enhance interaction, teaching presence, and critical thinking processes (Halaweh, 2023). The advanced semantic analysis capabilities of ChatGPT extend beyond basic grammatical, lexical, or stylistic corrections. These tasks can already be performed by less sophisticated online programs like Google Translate, Deepl, Grammarly or InstaText. In contrast, ChatGPT offers connotative and denotative evaluations based on natural language analysis. This enables it to perform interpretive tasks that were traditionally exclusive to human teachers. The user's freedom to assign commands in dialogue represents a disruptive aspect in the current landscape of AI tools for educational experiences. The ability to give instructions using natural language, without relying on artificial syntax used in programming languages, eliminates barriers that were present in highly specialized sectors operating with machine codes or computer languages. Nevertheless, research highlights the importance of digital literacy among educators and students to responsibly leverage ChatGPT while being mindful of its limitations (Xiao & Zhi, 2023). Based on our experience, we have derived useful observations for teachers who want to explore the potential applications of this AI tool:

- dynamic text comprehension. It can understand the meaning and nuances of a text (or a sequence of textual interactions) and deepen its interpretation in successive steps, while maintaining memory of what has been done before. This allows the AI to accurately interpret semantic nuances and relationships between elements within a sentence, paragraph, text, dialogic interaction, or debate involving multiple agents;
- consistent and cohesive responses. It can generate coherent and structured responses, maintaining logical and semantic cohesion in responding to complex questions or detailed elaboration requests. This cohesion is maintained regardless of the length of the text(s). Equally, it can continue to process content already formulated, expanding the accuracy of the analysis or shifting the focus to other aspects;
- long context management. It can process and maintain understanding of a long context over time, managing answers to questions that require knowledge accumulated over an extended dialogue. In other words, ChatGPT “remembers” the entire history of our conversation if it is not archived and remains open. Moreover, a conversation that has already been archived can be reopened at a later time and ChatGPT will immediately recall all the details;
- capability to deduce in the presence of complexity and ambiguity. It can conjecture the intentions implicitly expressed in the text, i.e., can interpret the input even in the case of grammatical errors and provide appropriate responses, even in situations where the contents are ambiguous or not explicit;
- ability to assign emotional concepts to linguistic content. This aspect undoubtedly represents the most innovative feature of open AI. ChatGPT has demonstrated the ability to infer the basic emotional nuances present in text, then to enunciate an evaluation of the emotions expressed by the author. In our case, it demonstrated the ability to discriminate concepts such as optimism, worry, confidence, or ambition. This is particularly useful in contexts where detecting emotional patterns plays a crucial role, such as in informal conversations, virtual assistance, or interaction with content involving complex emotional facets. Unquestionably, the risk of manipulation and undue influence underscores the importance of vigilance in its application, especially in persuasive contexts. Furthermore, the accuracy of ChatGPT’s assessments bears implications for users’ psychological well-being, warranting cautious deployment, particularly in sensitive domains such as psychological support. Transparency and accountability are imperative, necessitating clear communication of ChatGPT’s functioning and mechanisms for recourse in case of disagreement. Also, cultural sensitivity is vital to ensure that interpretations align with diverse cultural norms surrounding emotions. In navigating these ethical considerations, it is essential to further explore the implication when using AI to analyse written as well as oral language contents.

4. Conclusions

In its current state of development, ChatGPT offers valuable and enticing performances to flank and facilitate a range of routine activities of the teaching profession associated with instructional planning, evaluation of papers, compilation of analytical judgments, profiling based on textual information, and organization of the class group by behavioral categories. The ability to make inferences based on textual content allows for an appreciation of the

objectivity and consistency of the outputs of this AI tool. In other words, ChatGPT infers, deduces, and argues exclusively from what is said in the text. There is no need for dedicated teacher training in the practical use of the tool, given the high degree of intuitiveness it offers. Otherwise, we see the need for pilot experiences that indicate teaching approaches associated with individual disciplines, and, above all, a normative outline that sets objective limits as to what can be factually integrated into both curricular and functional teaching activities. There emerges a need for an ethical rather than an operational framework since all the operations we have carried out with ChatGPT are not susceptible to verification or authentication. Indeed, if taken out of the context of this contribution they would turn out to be, no more and no less, than the direct result of human work. For this reason, it is neither wise nor far-sighted to further delay open discussion and regulation of this technology.

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